

# ***HYBRID MICROLENS ARRAY***

## **ABSTRACT OF THE DISCLOSURE**

5 The disclosed hybrid microlens enables the economical production of large diameter, high numerical aperture refractive microlens by microfabrication. The hybrid microlens has a combination of a refractive microlens formed on a thin layer of high index material such as silicon and a spacer layer of a low index material such as fused silica. Advantages include substantially reduced lens sag, fast etching of the microlens, small wafer stack thickness, large diffraction angle in the low index spacer, large optical beam diameter, high optical performance, and low cost.

10 Also disclosed is a design for substantially reduced optical return signal and small polarization dependent optical loss from an optical fiber which is perpendicular to and butt-coupled to a planar optical surface. This design is to form a small slanted surface on the planar optical surface in the vicinity of the optical fiber core and fill the space between the fiber and the slanted surface with an index-matching optical epoxy.